POWER INSERTER CONFIGURATION FOR WIRELESS MODEMS

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims priority from U.S. Provisional Application entitled POWER INSERTER CONFIGURATION FOR WIRELESS MODEMS, filed January 26, 2000, Application Serial No. 60/178,153, the disclosure of which is herein incorporated by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to the field of wireless modems, and more particularly to a power inserter configuration for wireless modems.

2. Description of the Related Art

In order to provide high-speed Internet access, many cable companies are providing broadband Internet access via traditional coaxial cable. Modernly, cable systems comprise a fiber optic network, with coaxial cable lines connecting each residence to a "head-end." These systems are commonly referred to as Hybrid Fiber Coax (HFC) systems. Even though cable access provides much greater performance than traditional telephone modem connections, the bandwidth is still not sufficient to provide high-speed access to a large number of users. In order to overcome this problem, wireless modems have recently been proposed in order to bypass the traditional coaxial cable, and connect directly to a "head-end" system.

As shown in Figure 1, a wireless modem system for each residence may include an antenna connected to a transverter 6, which is usually mounted outside the residence near the antenna. In order to provide electrical power to the transverter 6, without supplying a separate electrical connection, power is "inserted" onto the coaxial data cable that connects

the wireless modem 2 and the transverter 6. A power inserter block 4 may be implemented as shown by the circuit 16 of Figure 2. A capacitor 12 blocks DC from the power inserter power source 10 from entering the modem. An inductor 14 blocks IF from the modem 2 from going to the power inserter power source 10. The result is that all of the IF energy and the DC power is sent to the transverter 6.

The addition of the power inserter circuit 4 saves the expense of installing a separate electrical power connection to the transverter 6, but adds two additional electrical connectors between the modem 2 and the transverter 6. Furthermore, the electrical connectors on the power inserter are generally the same type of connector. If a user accidentally connects the power inserter 4 in the reverse direction, the DC voltage will enter the modem's output connection and possibly cause permanent damage. Thus, there is a need to provide an improved power inserter configuration for wireless modems.

SUMMARY OF THE INVENTION

According to the present invention, a wireless modem contains a power inserter circuit along with the traditional modem components. The power inserter circuit isolates the modem components from DC power that is inserted on the coaxial cable to a transverter. Also, the power inserter circuit isolates a power source from the IF energy from the modem components that is sent to the transverter. One embodiment of the present invention further provides for a wireless modem that contains separate power connections for the modem components and the transverter. Another embodiment of the present invention provides for one power connection for the wireless modem and a DC -to-DC converter for the modem component power. The power source is selected based on the power requirements of the transverter and the DC-to-DC converter converts the input voltage to the voltage level required by the modem components.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will be readily understood by the following detailed description in conjunction with the accompanying drawings, wherein like reference numerals designate like structural elements, and in which:

Figure 1 is a block diagram of a prior art wireless modem system;

Figure 2 is a schematic of the power inserter circuit of Figure 1;

Figure 3 is a block diagram of a power inserter and wireless modem configured according to the present invention;

Figure 4 is a block diagram of the present invention with a dual power source; and

Figure 5 is a block diagram of the present invention with a DC-to-DC converter in the wireless modem and a single input power source.

DESCRIPTION OF THE INVENTION

The following description is provided to enable any person skilled in the art to make and use the invention and sets forth the best modes contemplated by the inventor for carrying out the invention. Various modifications, however, will remain readily apparent to those skilled in the art, since the basic principles of the present invention have been defined herein specifically to provide a power inserter configuration for wireless modem systems.

According to the present invention, a wireless modem 18 includes a power inserter circuit 16 to provide electrical power to a transverter 22 via a coaxial cable, as illustrated in Figure 3. The wireless modem 18 also contains modem components 26, which is the circuitry traditionally found in modems known by those skilled in the art. The coaxial cable also provides a signal path for data transfer between the wireless modem 18 and the

transverter 22. The power inserter circuit 16 shields the output of the modem components 26 from DC power insertion from a power source 20. Also, the power inserter circuit 16 shields the power source 20 from IF energy from the output of the modem components 26. Thus, the present invention eliminates the possibility of accidental voltage injection into the wireless modem 18.

In practical use, the transverter 22 may require different voltages depending on the manufacturer of the transverter 22. Typically, the voltages required by the transverter 22 range from 12 to 48 Volts. Unacceptable performance may result if too low of a voltage is used for the transverter 22. A voltage higher than that required by the transverter 22 may result in overheating or other damage to the transverter 22. The varying voltage levels required by the transverter 22 pose a problem because the wireless modem 16 and the transverter 22 may not use the same voltage. Thus, it would be desirable to have a more universal solution.

One solution is to require all transverter manufacturers to include a DC-to-DC converter in all transverters to achieve a fairly wide input voltage tolerance. This solution is not very desirable because it would require all transverter manufacturers to cooperate and agree on the same standards.

A second approach is illustrated in Figure 4. Here, a dual power source 28 has three connectors for a wireless modem 24: 1) a voltage connector for the modem components 26, 2) a voltage connector for the transverter 22, and 3) a common ground connector. This configuration supplies one voltage level to the modem components 26 and a separate voltage level for the transverter 22 by way of the power inserter circuit 16. This configuration eliminates the need to alter the transverter 22 voltage input. However, having a third connector on the dual power source 28 and the wireless modem 24 is more costly. Also, this

configuration is inefficient because it requires a user to obtain a dual power source 28 that matches the required voltage levels of the wireless modem 24 and the transverter 22.

A third approach is illustrated in Figure 5. A wireless modem 30 includes a DC-to-DC converter 32 to allow the wireless modem 30 to accept a wide range of input voltages. In this manner, a power source 34 is selected according to the voltage level required by the transverter 22. If the voltage required by the transverter 22 is not the same as the voltage required by the modem components 26, the DC-to-DC converter 32 converts the input voltage to the voltage level required by the modem components 26 for normal operation. Thus, the present invention eliminates a separate power connection and/or supply for the power inserter circuit 16, additional connections between the wireless modem 30 and the transverter 22, and the possibility of accidental power injection into the output of the modem components 26.

Those skilled in the art will appreciate that various adaptations and modifications of the just-described preferred embodiment can be configured without departing from the scope and spirit of the invention. Therefore, it is to be understood that, within the scope of the appended claims, the invention may be practiced other than as specifically described herein.